

active physiologically, but the action differs in kind from that of the simple bases, and resembles the action of natural bases or alkaloids having an approximately similar chemical composition.

7. All the substances examined in this research are remarkable for not possessing any specific paralytic action on the heart likely to cause syncope ; but they destroy life, in lethal doses, either by exhaustive convulsions or by gradual paralysis of the centres of respiration, thus causing asphyxia.

8. There is no immediate action on the sympathetic system of nerves, although there is probably a secondary action, because, after large doses, the vaso-motor centre, in common with other centres, becomes involved.

9. There is no appreciable difference between the physiological action of the bases obtained from cinchona and those derived from tar.

The physiological action of the substitution derivatives of these substances will be related in a further communication.

March 4, 1875.

JOSEPH DALTON HOOKER, C.B., President, in the Chair.

The Presents received were laid on the table, and thanks ordered for them.

The Right Hon. Sir Stafford H. Northcote was admitted into the Society.

In pursuance of the Statutes, the names of the Candidates for election into the Society were read as follows :—

William de Wiveleslie Abney, Capt. R.E.	Joseph Fayrer, M.D.
William Archer, M.R.I.A.	Augustus H. Lane Fox, Colonel.
Edward Middleton Barry, R.A.	Francis Stephen Bennet Frangois de Chaumont, M.D.
James Risdon Bennett, M.D.	Alfred Henry Garrod, B.A.
Dietrich Brandis, Ph.D.	James Geikie, F.R.S.E.
Charles Orde Browne, Capt. R.A.	James Whitbread Lee Glaisher, M.A.
George Buchanan, M.D.	Thomas Minchin Goodeve, M.A.
Walter Lawry Buller, Sc.D.	Charles Alexander Gordon, M.D., C.B.
James Caird, C.B.	Robert Baldwin Hayward, M.A.
John Casey, LL.D.	John Baboneau Nickterlien Hennessy, F.R.A.S.
William Chimmo, Capt. R.N.	John Hughlings Jackson, M.D.
Latimer Clark, F.R.A.S.	Emanuel Klein, M.D.
Cuthbert Collingwood, M.A.	E. Ray Lankester, M.A.
George Critchett, F.R.C.S.	
Herbert Davies, M.D.	
August Dupré, Ph.D.	

Squire Thornton Stratford Lecky,	Harry Govier Seeley.
Lieut. R.N.R.	Joseph Sidebotham.
Robert M'Lachlan, F.L.S.	John Spiller, F.C.S.
Richard Henry Major.	Robert Swinhoe.
John William Mallet, Ph.D.	George James Symons, V.P.M.S.
George Strong Nares, Capt. R.N.	Sir Henry Thompson, F.R.C.S.
Robert Stirling Newall, F.R.A.S.	Thomas Edward Thorpe, Ph.D.
Oliver Pemberton.	Charles Todd (Obs., Adelaide).
David Simpson Price, Ph.D.	Edwin T. Truman, M.R.C.S.
William Roberts, M.D.	Wildman Orange Whitehouse, C.E.
William Chandler Roberts, F.C.S.	Thomas Alexander Wise, M.D.
William Rutherford, M.D.	Archibald Henry Plantagenet
Henry Young Darracott Scott,	Stuart Wortley.
Major-General, C.B.	Sir Matthew Digby Wyatt, Knt.

The following Papers were read :—

- I. "On the Tides of the Arctic Seas.—Part VI. Tides of Port Kennedy, in Bellot Strait, in July 1859." By the Rev. SAMUEL HAUGHTON, M.D. Dublin, D.C.L. Oxon., F.R.S., Fellow of Trinity College, Dublin. Received January 20, 1875.

(Abstract.)

These observations were made on board the yacht 'Fox,' under the command of Sir Leopold M'Clintock, during his successful search for the remains of the Franklin Expedition.

The heights of the tide were observed every hour during 23 days, and the results obtained were extremely interesting.

The tides of Port Kennedy are remarkable for two points :—

1. The magnitude of the diurnal tide.
2. The solar diurnal tide is greater than the lunar diurnal tide.

The following tidal constants have been successfully determined :—

I. DIURNAL TIDE.

Solar Diurnal Tide.

- | | |
|----------------------------------|--|
| 1. Age | Unknown. |
| 2. True Solitidal Interval | 5 ^h 12 ^m 7½ ^s . |
| 3. Coefficient | 23·4 inches. |

Lunar Diurnal Tide.

- | | |
|---------------------------------|--|
| 1. Age | { 1 ^a 4 ^h 14½ ^m (time). |
| | { 4 6 20½ (height). |
| 2. True Lunitidal Interval | 0 ^h 33 ^m 50 ^s . |
| 3. Coefficient | { 18·4 inches (time). |
| | { 23·37 „ (height). |
| | 2 A 2 |

II. SEMIDIURNAL TIDE.

*Lunar Semidiurnal Tide.*True Lunitidal Interval..... $23^h 48^m 1^s$.Uncorrected ratio of Solar and } $S'' = \begin{cases} 0.412 \text{ inch (height).} \\ 0.549 \text{ ,, (time).} \end{cases}$ Lunar Coefficients } $M'' =$

II. "Note on the Value of a certain Definite Integral." By
I. TODHUNTER, M.A., F.R.S., Honorary Fellow of St. John's
College, Cambridge. Received February 13, 1875.

Let $P_m(x)$ denote Legendre's coefficient of the order m , and $P_n(x)$ that of the order n : it is required to find the value of $\int_0^1 P_m(x) P_n(x) dx$. We need not consider the case in which $m=n$; for it is an established result that the value of the integral taken between the limits -1 and 1 is then equal to $\frac{2}{2n+1}$, and the value between the limits 0 and 1 will be half of this. We suppose now that m and n are different.

It is known that

$$P_m(x) = \frac{1 \cdot 3 \cdot 5 \dots (2m-1)}{m!} \left\{ x^m - \frac{m(m-1)}{2(2m-1)} x^{m-2} + \dots \right\}, \dots (1)$$

and also that

$$\frac{d}{dx} \left\{ (1-x^2) \frac{dP_m(x)}{dx} \right\} + m(m+1) P_m(x) = 0. \dots (2)$$

Similar expressions, of course, hold for $P_n(x)$.

Now, by a well-known process of integration by parts, we deduce

$$\begin{aligned} & \{m(m+1) - n(n+1)\} \int_0^1 P_m(x) P_n(x) dx \\ &= \left\{ P_m(x) \frac{dP_n(x)}{dx} - P_n(x) \frac{dP_m(x)}{dx} \right\} (1-x^2); \end{aligned}$$

this formula can also be immediately verified by differentiation and the use of (2).

Thus

$$\begin{aligned} & \{m(m+1) - n(n+1)\} \int_0^1 P_m(x) P_n(x) dx \\ &= \left\{ P_n(x) \frac{dP_m(x)}{dx} - P_m(x) \frac{dP_n(x)}{dx} \right\}_{x=0}. \end{aligned}$$

If m and n are both even or both odd, the right-hand member of the last formula will vanish by (1); thus the only case we have to consider